same time the remaining sections of the work have been revised by British authorities, and, wherever necessary, modified in the same sense. In addition, each section has been brought up to date by the inclusion of all relevant matter of importance.

The sections on mineral-oils, lubricants, oils, fats, and waxes, and the special methods of analysis employed in the oil and fat industries were contributed or revised by the late Dr. Lewkowitsch—an acknowledged authority on this class of subjects. Dr. Lewkowitsch also revised the English translation of Dr. Dieterich's article on resins, balsams, and gum-resins. The same author's article on drugs and galenical preparations has been revised by Dr. Power, who has also taken charge of Dr. Gildemeister's contribution on essential oils. The sections on tartaric and citric acids have been entrusted to Mr. Davis, whilst the general subject of organic preparations—a somewhat vague class—has been dealt with by the Editor. This section is concerned more particularly, although by no means exclusively, with pharmaceutical preparations, and is based upon an article by Dr. Messner of the firm of Merck and Co., of Darmstadt. The important section on rubber has been revised by Dr. Caspari, who, however, has nothing to say concerning synthetic rubber, from which we may infer how small has been the influence of the "boom" on "artificial rubber" on the actual production of this substance.

Vegetable tanning materials and leather have been revised by Prof. Procter, an acknowledged authority on the scientific aspects of tanning; whilst sugar, starch, and dextrin have been dealt with by Mr. Arthur R. Ling—no less an authority on these particular subjects—who has also rewritten, in conjunction with Mr. Cecil Jones, a valuable article on brewing materials and beer. Paper has received the attention of Messrs. Cross, Bevan and Bacon; textile fibres that of Prof. Hübner, of the Manchester School of Technology; while Messrs. Rawlins and Rule have revised Prof. Eibner's article on inorganic colours. It will be seen, therefore, from this list of names that Dr. Keane has spared no pains in securing the collaboration of competent authorities on chemical analysis as applied to technical products and processes.

The book, like its predecessors, should find a place in the library of every consulting and analytical chemist, as well as in that of every well-equipped works laboratory. A very commendable feature of the work is the admirable bibliography which accompanies each article.

Another feature, even more valuable, is seen in the extent to which individual revisers have brought their special experience to bear upon the sections entrusted to them, thereby greatly enhancing their merit. This makes the English edition of the work doubly valuable, as compared with the German original, since each article has passed, so to say, twice through the refining fire of expert assayers.

(2) Prof. Lunge's book on technical gas analysis is in a sense the third edition of his well-known handbook of technical gas analysis, originally based upon the late Prof. Clemens Winkler's "Anleitung zur chemischen Untersuchung der Industrie-Gase." During the dozen years which have elapsed since the publication of the second edition of the handbook the subject has received an extraordinary development, and great changes have occurred in procedure and apparatus. The application of technical gas analysis has been largely extended, and its value as an analytical agent in industrial processes, and even in connection with hygiene, has been widely recognised. Hence the time had arrived when the comparatively narrow limitations of Clemens Winkler's treatise had to be discarded, and the book under review is, therefore, practically a new work, differing wholly in groundwork and arrangement from that on which it was originally based. So far as we have been able to discover, all branches of the subject have received adequate treatment. The bibliographical references are copious and up-to-date. Lastly, the book is well printed, excellently illustrated, and the indexes of authors' names and of subjects are remarkably full.

T.

TWO BOOKS ON THE EARTH.

(1) *Geology of To-day.* A Popular Introduction in Simple Language. By Prof. J. W. Gregory. Pp. 328. (London: Seeley, Service and Co., Ltd., 1915.) Price 5*s.* net.

(2) *College Physiography.* By Prof. R. S. Tarr. Published under the editorial direction of Prof. L. Martin. Pp. xxii+837. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1914.) Price 15*s.* net.

THESE two books are professedly written for two different types of reader; but the college student may well read Prof. Gregory's "popular introduction" from end to end, while the lover of "simple language" will find nothing to alarm him in the work of the late Prof. Tarr.

(1) Prof. Gregory has brought the latest results and the current discussions of geologists before every thoughtful person to whom the earth appeals. We possess a number of popular text-books on geology, but "Geology of To-day" justi-

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fies its title, and stands entirely apart. The alarming illustration with which it opens, representing a statue of Louis Agassiz plunged head-downwards in the ground, is not symbolical of the tendencies of the text. The author traces the growth of geological philosophy without exulting over the imperfections of those who have gone before. The hardy old *pièces justificatives* are quoted, but are supplemented by observations of very recent origin. On p. 141, for instance, Day and Shepherd's work on the volcanic gases of Hawaii is cited in refutation of the critical thesis so enticingly maintained by Brun; but how many of our current text-books have got so far as mentioning Brun? He certainly never shook Tarr's faith in the potency of steam as a volcanic agent ("College Physiography," p. 444), and Prof. Gregory's references are all the more welcome as recording a really memorable, if short-lived, controversy.

The chapters on "How mountains are made," with its review of the possible influence of radium, and on "How mountains are upheld," with its lucid exposition of isostasy, are good examples of Prof. Gregory's method. The section devoted to life-history, occupying nearly half the book, contains no detailed description of stratified formations, but consists of essays on "The Origin of Life," "The Interpretation of Fossils," "The Evolution of Mammals," and so forth. Miss Alice Woodward has contributed some spirited original drawings of incidents in the life of fossil vertebrates, and Hagenbeck's models at Hamburg are also utilised. In these chapters the terrestrial and fluviatile origin of the Old Red Sandstone conglomerates is well stated (p. 204); we are introduced to Gigantosaurus of East Africa, the super-dreadnought of land-animals (p. 259); and to the beaked flints from the English Pliocene (p. 306), for which the author is quite willing to accept a human origin.

On glacial matters he preserves considerable caution; here only his geology seems not quite of to-day, though it is that of a very recent yesterday. To describe (p. 212) the evidence of Permian glaciation as indicating that "the climate of parts of the Southern Hemisphere was therefore colder than it is at present," must be regarded as a very moderate statement. In his memorable journeys in Spitsbergen, Prof. Gregory (p. 227) was unfortunate in not coming across modern boulder-clays. The precise parallel between the material left behind by the von Post glacier and that of deposits in the British Isles would, for instance, have reassured him. Too little seems made of the fact that sheets of boulder-clay represent the unmeltable residue of glaciers that, in their lower portions, consist half of ice and half of stones. During the melting of such glaciers there is no copious flow in the lower layers sufficient to sweep away all the finer particles. The loamy matter settles downwards in the interstices of the abundant and striated stones.

The fine series of photographs of Javan volcanoes is very welcome. So is the whole of this stimulating volume. The author does not accept (p. 81) the opinion of German writers as to the origin of their own word *feldspath*; but A. Brongniart attempted the same thing in 1807 in his "Traité de Minéralogie" (p. 355) without success.

(2) The handsome book by the late Prof. Tarr and Mr. L. Martin is of the serious and detailed type suggested by its title. It owes much to the extensive and observant travels of Prof. Tarr, and particularly to his work on glaciers and recent uplifts in Alaska (pp. 214, 390, etc.). The illustrations are numerous, and some of the diagrams would bear enlargement, those on river-erosion, for instance, being not too clear (p. 557, etc.). The view of Innsbruck on p. 525 represents the snow of spring or autumn, but not "The Alps rising above the snow line." The illustrations, however, generally supplement in a valuable way those of European text-books. The treatment of the features due to stationary and shrinking ice-sheets is especially interesting (ch. ix). The last seven chapters, dealing with the atmosphere and terrestrial magnetism, are due to the faithful and experienced editor, Mr. L. Martin, who has worked and travelled with Prof. Tarr.

GRENVILLE A. J. COLE.

MATHEMATICAL TEXT-BOOKS.

(1) *Pendlebury's New Concrete Arithmetic.* By C. Pendlebury and H. Leather. First Year. Pp. 57. Price 4*d.* Second Year. Pp. 54. Price 4*d.* Third Year. Pp. 57. Price 4*d.* Fourth Year. Pp. 56. Price 6*d.* Fifth Year. Pp. 71. Price 6*d.* (London: G. Bell and Sons, Ltd., 1914.)

(2) *A First Course in Mathematics for Technical Students.* By P. J. Haler and A. H. Stuart. Pp. vi+125. (London: University Tutorial Press, Ltd., 1914.) Price 1*s.* 6*d.*

(3) *A Course of Geometry Theoretical and Practical: a Class-book for Secondary and Technical Schools.* By A. H. Bell. Pp. viii+127. (London: Rivingtons, 1914.) Price 2*s.* 6*d.*

(4) *A Treatise on Dynamics.* By Dr. W. H. Besant. Revised and enlarged by A. S. Ramsey. Fifth edition. Pp. xv+443. (London: G. Bell and Sons, Ltd., 1914.) Price 12*s.*

(5) *Examples and Test Papers in Algebra.* By W. J. Walker. Parts ii. and iii. Pp. viii+

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